ATTACHMENT A
JUNE 26, 2003
PROPOSED CHANGES TO SPECIFICATIONS SELECTIONS 400 & 828

I. Where will the asphalt mixes be tweaked?

1. In-place Air voids
2. Ndesign – Number of Gyrations
3. Mix Gradation Bands

Discussion: Peter advised that it would be necessary to make a number of adjustments at the same time in order to adequately address the current problems with Superpave mixes. We would need to reduce the amount of in-place air voids, come up with a different way of determining the number of needed gyrations, and adjust the gradation bands.

II. What's the revision on in-place air voids that are currently being considered?

The maximum mean air voids will be changed from 7.8% to the following new numbers: 5.0% for 25 mm Superpave, 6% for 19 mm Superpave and SMA, and 7% for 12.5 mm and 9.5 mm Superpave.

Discussion: These suggested air voids were presented for general discussion and to see if the committee thought the requirements were realistic.

III. Can you explain why the existing 7.8% criteria has to be changed?

Traditionally, it has been thought that once voids reached 8% or higher, a conventional dense grade mix starts to get interconnected voids which allow air and moisture to permeate the pavement which reduces the durability of the pavement. Therefore, 7.8% criteria worked well with Marshall mixes in Georgia. However, coarse graded Superpave presented a new challenge to this criteria – interconnected in-place air voids/permeability occurred in even mixes with air void lower than 7.8%.

Discussion: With the current air void specification, entire projects could be constructed meeting specification requirements but still have permeability issues.

IV. Are you sure this is not a "crazy stuff"?

A lengthy list of permeable mixes can be given out since Superpave was implemented in Georgia: US 341, US 441, US 278, US 41, US 411, SR 20, SR 124, SR 134 and….

Georgia's permeability study was just completed. NCHRP study on evaluation pf permeable mix is currently underway *NCAT is the research contractor). Florida DOT has a permeability specification. New England Transportation Consortium published a comprehensive research on Evaluation of Permeability of Superpave Mixes, and…

Discussion: Research has demonstrated that permeability in Superpave mixes is a reality that states other than Georgia are also experiencing.

V. What have you found so far that lead to the "tweaking" of mixes?

Air voids, gradation and aggregate size of mixes all have effect on permeability.

Amounts of interconnected air voids were found to be significantly higher for coarse graded Superpave mixes.

Permeability was found to be significantly affected by control sieve, the 2.36 mm sieve (or #8 sieve).

Discussion: Research has shown that a number of contributing factors have lead to the permeability problems with Superpave mixes.

Critical Percent Passing the #8 Sieve for Specific Air Voids

Air Voids	Allowable % Passing #8 Sieve
5	>25
6	>31
7	>41
8	>45

The less percent passing the #8 sieve, the tighter the air voids must be in order to prevent the mixes from being permeable. Our current gradation bands need to be raised to help fix this problem.

VI. What is the basis that in-place air voids should be decreased with increase of aggregate size as present in Section 2?

This goes back to % passing on control sieve, the 2.36 mm sieve (#8 sieve), it is found in research/study that there is a relationship between critical percent passing #8 sieve and allowable in-place air voids to avoid EXCESSIVE

permeability: 5% for 25% or greater; 6% for 31% or greater; and 7% for 41% or greater passing #8 sieve.

VII. Why do the existing four (4) design levels have to be "tweaked" too?

It has to be discussed together with the "Locking Point" – the point during gyratory compaction at which the asphalt mix exhibits a remarkable increase in resistance to further densification.

The "Locking Point" has found to be related to compaction tendencies in the field. Compaction of a mix passing "locking point" generally results in aggregate degradation that is not representative of field compaction, and thus the benefit of compacting mix to very high gyration levels, such as 125 or even 100 gyrations is questionable.

Discussion: We believe that by going to a design process where we gyrate only to the "locking point" of a mix, we better duplicate what actually occurs in the field. If we gyrate a mix too much, we actually end up fracturing the aggregate and also arrive at an unrealistic optimum AC content that produces a mix that can not be laid in the field without adjustments.

VIII. What would be the typical "Locking Points" or No. of Gyrations determined as a stop point?

A recent study at GDOT found the typical "locking points" are in the range between low 60's to high 80's measured with Superpave gyratory compactor for Georgia aggregates.

The "locking points" varied with quarries, aggregate types, and gradations.

"First locking point" for Level I mixes (Level "B" minus) and "second locking point" for Level II mixes (Level "C" minus).

Discussion: Our initial research has shown that by going to two levels – first locking point and second locking point, we end up with gyrations in the low 60's for the first point and the high 80's for the second point typically.

IX. Why do the gradation bands in existing specification have to be "tweaked" too?

The existing specification has lower limits with 25%, 29%, and 34% passing $8 sieve for 25 mm, 19 mm, and 12.5 mm mixes, which require less than 5%, 5.7%, and 6.3% to avoid excessive permeability, which are all lower than the current 7.8% allowable in-place air voids.

Expand existing specification upper limits to encourage contractors to design a mix more toward find graded Superpave mixes while maintaining existing lower limits as long as the contractor is able to achieve NEW in-place air void criteria.

Discussion: By changing our gradation bands, we can fine up our mixes which will help to also contribute to less permeable mixes and well as help in compaction.

X. Will this "tweaking" process forfeit all my mix designs that I have invested in?

No. It is believed that the majority of the existing mix designs can be kept on design books by BACK-CALUCATION from higher level of gyrations to locking points. Therefore, those designs can be re-published with new criteria without substantial lab work. However, a small percentage of "under perform" designs may need to be redesigned, or the design requirements may be waived if the NEW in-place air voids can be achieved after a successful field adjustment.

Discussion: Many current designs will be able to be back calculated to come up with new optimum AC contents so hot mix producers should not have unreasonable costs to redesign all their mixes.